

OFFICIAL
RECEIVED
CENTRAL FAX CENTER

DEC 08 2003

EXPEDITED PROCEDURE
PURSUANT TO 37 C.F.R. § 1.116
ART UNIT 2812

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Ning Attorney Docket No.: 01 P 18264 US
Serial No.: 10/057,575 Group Art Unit: 1762
Filed: January 25, 2002 Examiner: Brian K. Talbot
Title: Vertical MIMCap Manufacturing Method

Mail Stop: After-Final Amendment
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Response Pursuant to 37 C.F.R. § 1.116

Dear Sir:

The following remarks are presented in response to the Examiner's Final Office Action mailed on October 6, 2003. They are respectfully submitted as a full and complete response to that Office Action. Favorable consideration of the above-referenced patent application is respectfully requested.

10/057,575

01 P 18264 US
December 2003 - 37 C.F.R § 1.116 Response

Remarks

Claims 1-27 are pending in the present application. The Applicant respectfully requests reconsideration and allowance of the pending application.

Claims 1-27 have been rejected by the Examiner under 35 U.S.C. § 103(a) as being unpatentable over Wong *et al.* (2002/0253551) in combination with Ning (6,451,667) or Lee *et al.* (5,918,135). The Applicant respectfully traverses the Examiner's rejections.

First, regarding the Ning reference, the Applicant notes that Ning is not prior art for this patent application. 35 U.S.C. § 102(e) only applies to "a patent granted on an application for patent *by another* filed in the United States before the invention by the applicant for patent...". In this case, the inventorship of the present application and the Ning reference is identical. Therefore, Ning cannot be used as a reference as prior art for the present application.

Also, as another matter, the Applicant notes that Lee *et al.* do not disclose a vertical capacitor as each of the Applicant's claims are directed towards. Rather, Lee *et al.* teach electrodes 122 and 112a (see Figure 9 and Col 3, lines 13-65) of a capacitor arranged laterally in a contact hole. Thus, one skilled in the art would not turn to Lee *et al.* to produce elements of the Applicant's claimed invention. Even if one were to do so, combining Wong *et al.* with Lee *et al.* does not produce the Applicants' independent Claims 1, 12, and 21, to be described further herein.

Regarding the Applicant's independent Claim 1, Claim 1 recites, "patterning the insulating layer with a plurality of trenches, said insulating layer comprising at least one first region and at least one second region, the first region comprising trenches for at least one

10/057,575

01 P 18264 US
December 2003 - 37 C.F.R. § 1.116 Response

MIMCap, said trenches having equal dimensions.” As the Examiner admits, Wong *et al.* do not teach trenches having equal dimensions. The Examiner turns to Ning or Lee *et al.* for this feature. Ning is not prior art for this patent application, as described above. Regarding Lee *et al.*, not only do Lee *et al.* not teach or suggest a vertical capacitor, Lee *et al.* also do not teach or suggest patterning an insulating layer to form trenches having equal dimensions, as recited in Claim 1. Contact hole 118 is formed in a separate step (see Lee *et al.*, Figure 6) than second contact hole 124 (see Lee *et al.*, Figure 6), resulting in the two contact holes 118 and 124 having a different shape e.g., at a top portion. For example, hole 118 has sharp features proximate curves, whereas hole 124 has more rounded edges. Furthermore, Lee *et al.* do not teach or suggest, “depositing a third conductive material over the thin dielectric layer within the first region trenches to completely fill the first region trenches,” as recited in Applicant’s Claim 1. Lee *et al.*’s upper capacitor electrode 122 does not completely fill the trench. See Lee *et al.*, Figure 7.

Therefore, combining Wong *et al.* with Lee *et al.*, as the Examiner suggests, does not produce the Applicant’s Claim 1. The Applicant asserts that Claim 1 stands allowable over the references of record.

Furthermore, it is respectfully submitted that Claims 2-11, which depend from Claim 1, are allowable by reason of dependence from an allowable claim as well as for adding further limitations, which narrow the scope of the particular independent claim and compel a broader interpretation of the base claim upon which they depend.

Regarding the Applicant’s independent Claim 12, this claim recites, “patterning the inter-level dielectric with a plurality of trenches, said inter-level dielectric comprising at least

10/057,575

01 P 18264 US
December 2003 - 37 C.F.R § 1.116 Response

one first region and at least one second region, the first region comprising trenches for at least one MIMCap, the second region comprising trenches for a plurality of conductive lines, wherein the trenches in the first region and the trenches in the second region have equal dimensions.” As discussed above, the Examiner admits that Wong, *et al.* do not teach trenches having equal dimensions, and the Examiner turns to Ning or Lee *et al.* for this feature. However, Lee *et al.* does not teach, anticipate, or suggest patterning an inter-level dielectric with trenches in a first (MIMcap) region and trenches in a second (conductive line) region having equal dimensions. Lee *et al.*’s trenches do not have equal dimensions. Lee *et al.* also do not teach, anticipate, or suggest, “depositing a second conductive material over the MIMCap dielectric within the first region trenches to form a MIMCap top plate, wherein the second conductive material completely fills the first region trenches,” as recited in Applicant’s Claim 12. Lee *et al.*’s upper capacitor electrode 122 does not completely fill the trench. See Lee *et al.*, Figure 7.

Therefore, combining the references as the Examiner suggests does not produce the Applicant’s Claim 12. The Applicant asserts that independent Claim 12 stands allowable over the references of record.

Furthermore, it is respectfully submitted that Claims 13-20, which depend from independent Claim 12, are allowable by reason of dependence from an allowable claim as well as for adding further limitations, which narrow the scope of the particular independent claim and compel a broader interpretation of the base claim upon which they depend.

Regarding the Applicant’s independent Claim 21, none of the references of record teach, anticipate, or suggest, “forming a first trench and a second trench in an insulating layer, the first

10/057,575

01 P 18264 US
December 2003 - 37 C.F.R § 1.116 Response

trench and second trench having substantially equal dimensions; forming a first conductive layer lining the first and second trenches; forming a dielectric layer over the first conductive layer in the first trench but not in the second trench; and forming a second conductive layer over the dielectric layer in the first trench and over the first conductive layer in the second trench, such that the second conductive layer substantially fills both the first trench and the second trench,” as recited in Claim 21. Again, the Examiner recognizes that Wong, *et al.* do not teach a first trench and second trench having substantially equal dimensions. Lee *et al.* do not teach a vertical MIM capacitor. Even if one were to combine Wong *et al.* with Lee *et al.*, Lee *et al.* do not teach, anticipate, or suggest, “forming a first trench and a second trench in an insulating layer, the first trench and second trench having substantially equal dimensions” as recited in Claim 21. Rather, Lee *et al.*’s two trenches have different shapes, as described above. Likewise, Lee *et al.* do not teach forming a first conductive layer lining the first and second trenches or forming a second conductive layer over the dielectric layer in the first trench and over the first conductive layer in the second trench, such that the second conductive layer substantially fills both the first trench and the second trench. Therefore, combining Wong *et al.* with Lee *et al.* as the Examiner suggests does not produce the Applicant’s Claim 21.

Because combining Wong *et al.* with Lee *et al.* does not produce Applicant’s independent Claim 21, the Applicant respectfully submits that independent Claim 21 stands allowable over the references of record.

Furthermore, it is respectfully submitted that Claims 22-27, which depend from independent Claim 21, are allowable by reason of dependence from an allowable claim as well as for adding further limitations, which narrow the scope of the particular independent claim and compel a

10/057,575

01 P 18264 US
December 2003 - 37 C.F.R. § 1.116 Response

broader interpretation of the base claim upon which they depend.

In conclusion, the Applicant respectfully requests that the Examiner allow Claims 1-27, and pass the present patent application to issuance. If the Examiner should have any questions or feel that a discussion would advance the prosecution, the Applicant invites the Examiner to contact the Applicant's attorney at the telephone number listed below.

Respectfully submitted,



Kay Houston
Attorney for Applicant
Reg. No. 38,495

Slater & Matsil, LLP
17950 Preston Road, Suite 1000
Dallas, Texas 75252
972-732-1001
972-732-9218 (fax)

10/057,575

01 P 18264 US
December 2003 - 37 C.F.R § 1.116 Response

Page 6 of 6